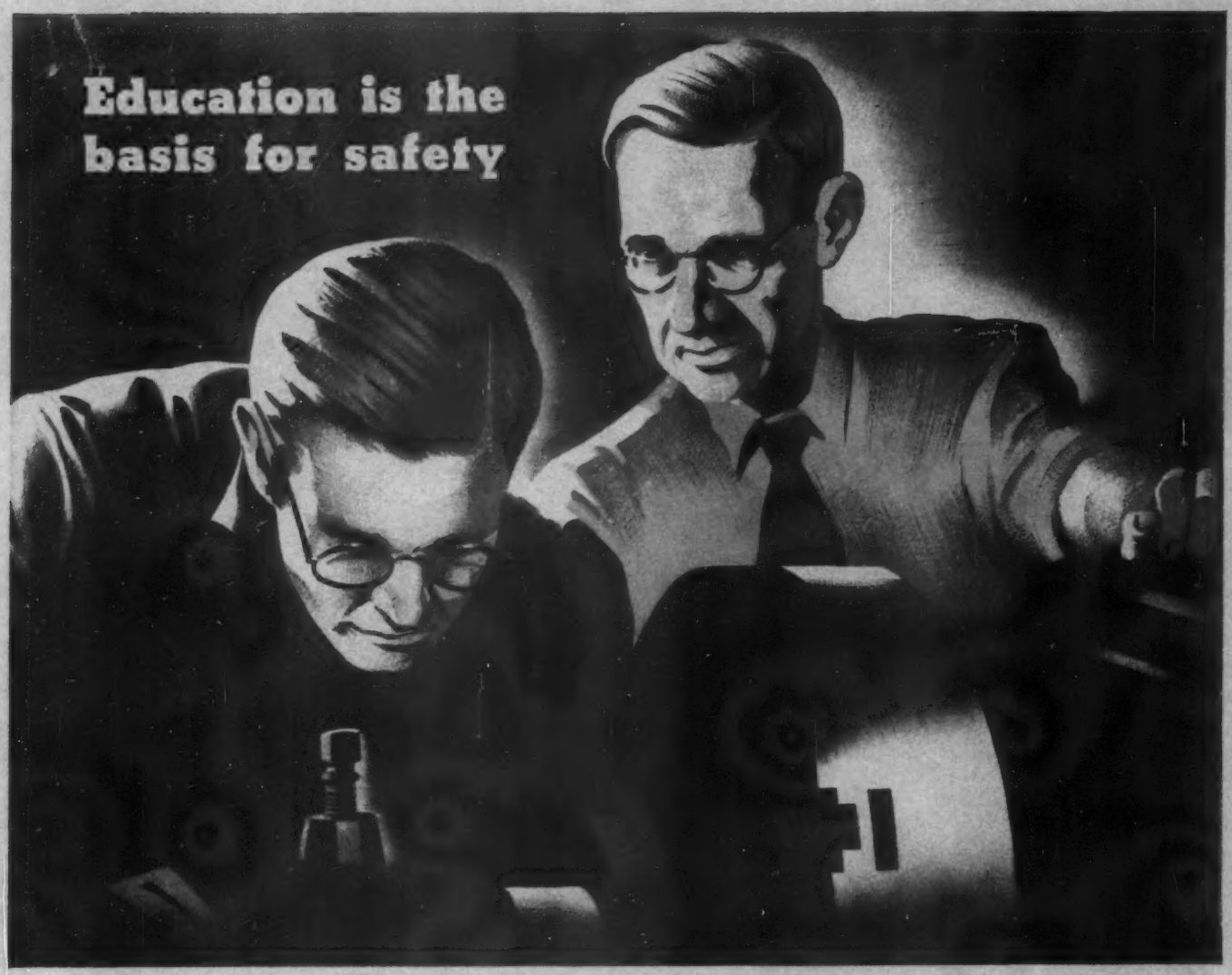
TECH ENGINEERING NEWS

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

DECEMBER · 1942

ENGINEER
SEE PAGE 8



Information supplied by the National Safety Council

Labor, particularly inexperienced labor, cannot be expected to recognize the full penalties of carelessness in the shop. Management has assumed the responsibility of supervising safety measures, and has cooperated in establishing sound safety rules.

Nevertheless, the large increase in labor personnel due to war needs, plus the influx of inexperienced men, have resulted in a substantial increase in lost time accidents.

Even assuming that the obvious safety measures with regard to operating machinery, electrical equipment and shop traffic have been installed, two factors — education and eternal vigilance — determine the real effectiveness of any safety program.

Both are the responsibility of the supervisory staff, from foremen up. The foreman who does a thorough job of educating his particular group in safety rules and cooperative enforcement has done much to cut down accidents. Management that takes an active interest in both safety education and the enforcement of safety measures has taken a great step forward in reducing wastage of irreplaceable production time.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.
MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

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500 Fifth Avenue • New York City

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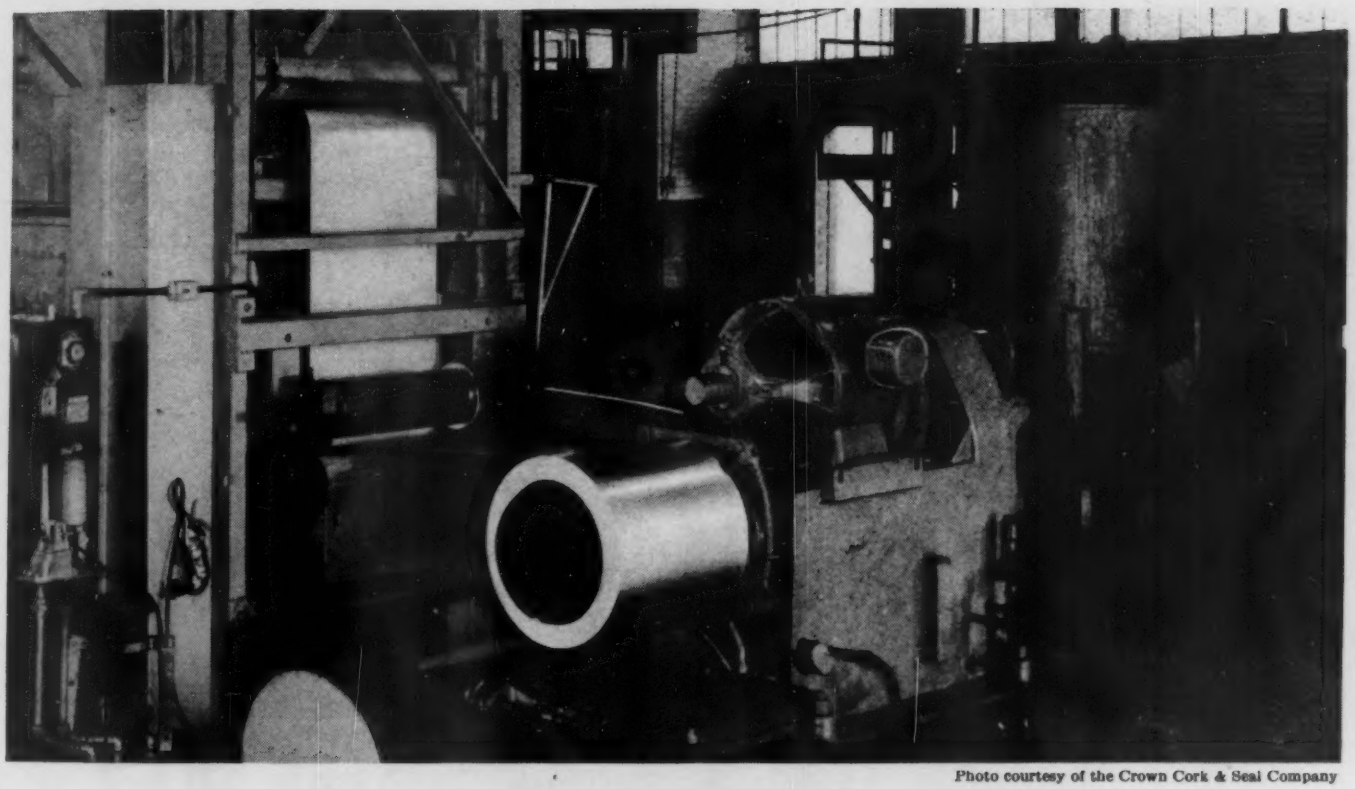


Photo courtesy of the Crown Cork & Seal Company

The best news about tin since we went to war

WHEN THE JAPS overran Malaya and the East Indies, they thought they had dealt a staggering blow to America.

For, overnight, tin became a most critical raw material, because America relies upon this bright metal for tin plate, bearing alloys, solder, collapsible tubes . . . *but mostly tin plate.*

However, Uncle Sam had an ace in the hole . . . *electrolytic tin plate.* In this process tin is deposited electrolytically . . . not hot-dipped . . . on steel strip. And only *one third* the normal thickness of tin is required.

Unfortunately, electrolytic tin plate is far from perfect as it comes from the plating baths. It is spongy and porous, not completely resistant to corrosion, and will not work well in can-making machines.

In order to make electrolytic tin plate usable, the tin deposit must be re-heated and *flowed* after plating. But until recently, even the best available re-heating and flowing processes were painfully slow, and therefore commercially impractical.

Right here is where Westinghouse "know how" stepped into the picture.

R. M. Baker, Westinghouse Research Engineer, together with Glenn E. Stoltz, of the Westinghouse Industry Engineering Department, decided that the porous tin coating could be *fused* . . . through the magic of electronics . . . to give the tin plate the desired corrosion-resistant property and surface brightness.

Baker and Stoltz built a high frequency coil, using radio broadcasting oscillator tubes for their power source. Through this coil they passed electrolytic tin plate. The inductive heating effect melted the tin coating . . . and it fused smoothly and evenly over the porous surface.

The new Westinghouse tin reflowing process is now in actual use, turning out gleaming ribbons of tin plate at better than 500 feet per minute. It will save many thousands of tons of tin every year!

• • • • •

What Baker and Stoltz did for the tin plate industry many engineering students in college today will do for other industries tomorrow.

Westinghouse knows where to find the future scientists America needs so badly on the industrial front . . . many will be among the technical graduates of the Class of '43.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Penna. Plants in 37 cities, offices everywhere.

RADIO WAVES FUSE TIN . . . R. M. Baker, Westinghouse Research Engineer, examines a test strip of tin plate which is passing through the experimental tin flowing mill. Baker joined Westinghouse after receiving his B.S. at Texas University. He earned an M.S. degree at the University of Pittsburgh.

Westinghouse

. . . making Electricity work for Victory

Get Ready Today

FOR THE ENGINEERING TASKS OF TOMORROW . . . LEARN TO KNOW YOUR BEARINGS . . .

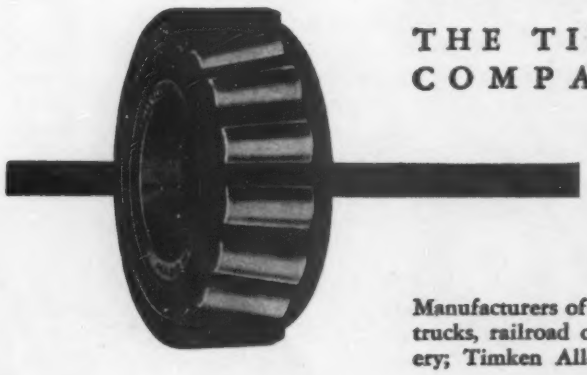
The thousands of experienced engineers who are doing so much to help win victory were students once, and no doubt often wondered what they would do after graduation—just as you probably do now.

But they didn't permit thoughts of the future to interfere with the present. They prepared for whatever might be ahead. Among other things *they learned to know their bearings*—knowledge that has proved to be one of their most useful engineering assets. You'll find it one of yours, too.

After world-wide destruction must come world-wide reconstruction; Timken Tapered Roller Bearings will play as important a part in the new machines of peace as they are doing in the machines of war.

If you have not done so already, begin now to acquire a thorough understanding of the design and application of the Timken Bearing. Our engineers—bearing specialists of many years' standing—will be glad to help you.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO



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TAPERED ROLLER BEARINGS

Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; and Timken Rock Bits.

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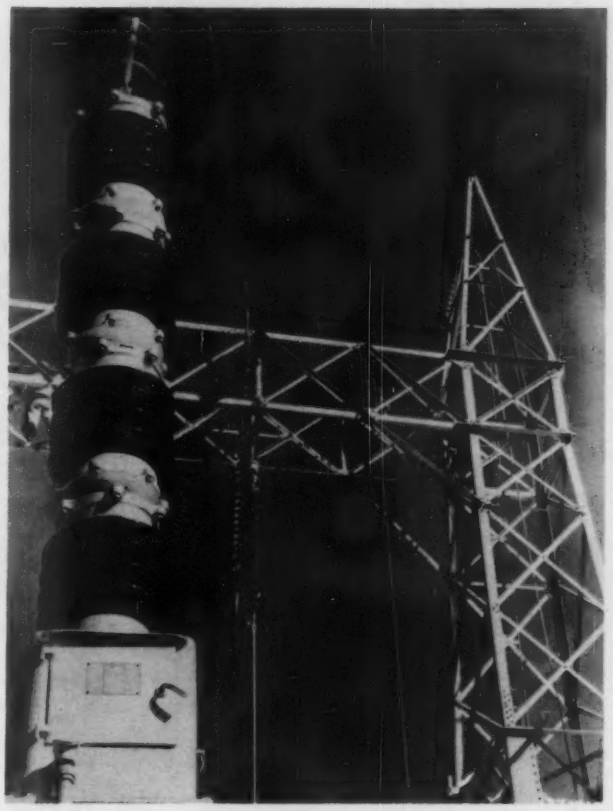

COVER

Mary Ellen McClurkin, University of Colorado graduate, studies a chart with the aid of a slide rule. Along with other women college graduates, she is being trained to take over the work formerly done by male engineers.

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CHEMICALS ON THE BATTLE FRONT

CHEMICAL INDUSTRY FULLY PREPARED FOR ITS PLACE IN WAR PRODUCTION

By EDGAR M. QUEENY

Edgar Monsanto Queeny, president of Monsanto Chemical Company, is a native mid-westerner. Born in St. Louis in 1897, the son of John Francis Queeny and Olga Monsanto Queeny, Edgar Queeny was four years old when the chemical and plastics company he now heads was founded by his father at 1800 South Second Street, St. Louis, and given the maiden name of his mother. After attending St. Louis public schools and the Pawling School at Pawling, N. Y., he matriculated at Cornell University as a chemistry major, class of 1919. His schooling was interrupted, however, when he enlisted in the United States Navy as a seaman immediately upon entrance of the United States in the World War. After attending Naval Officers' Training School at Newport, R. I., he was commissioned an ensign and served eight months overseas at Plymouth, England, later becoming a lieutenant and instructor in Gunnery and Navigation at the Mare Island Navy Yard. Mr. Queeny went to work for Monsanto in 1919, becoming its first advertising manager. In the early twenties he entered the sales department and progressed to sales managership and a vice-presidency. In 1928 he was elected president, the post he has held since.

ASK almost any member of the 1917 A.E.F. how a soldier's life differs in this war from the last and after mentioning the improved food he will probably say something to the effect that you have practically got to be an engineer to get anywhere in Uncle Sam's Army these days. As a matter of fact, you have to be an engineer to get anywhere in industry.

One has but to read the newspapers to realize the importance of mechanization in this war. Less apparent, but equally if not more important, is the part being played by chemistry and chemical transformation of materials.

The nations of the world are today locked together in what is fundamentally a war of materials. This is not to say that military strategy and good soldiering are no longer necessary to win battles. No one who understands warfare would ever make such a statement. But it does say that the chances for complete victory are far over on the side that has the greatest supplies of essential war materials *plus* the ability to convert those materials into effective weapons at a rapid rate.

It is in both of these respects that American chemical industry today is rendering basic service in the war effort. It is providing entirely new materials of strategic war value and it is helping convert old materials into more effective weapons.

Before discussing some of these things specifically, however, let us look at chemical industry in this country as it was just before the last war in contrast with what it was in 1939 when the present war officially began in Europe.

When America entered the last war she was faced with the task of creating a chemical industry overnight. What domestic manufacture of chemicals there was depended largely on raw materials or intermediates shipped into the country from Germany or Switzerland. Performing little short of a miracle, however, we did succeed between 1915 and 1918 in developing the industry from the small and dependent infant that it was into an industrial giant capable of producing sizable amounts of dyes, explosives and heavy chemicals.

Although I was not associated with Monsanto during the World War I, I am reminded of an experience of the company during that period which was typical of the problems faced by the industry and how they were overcome. Phenacetin was a drug being manufactured from paraphenetidin, a coal-tar intermediate imported from Germany. When the war broke out paraphenetidin was one of the chemical imports to be cut off. There was only a very small stock on hand and the phenacetin derived from it was being used extensively in the treatment of influenza. The company was faced with the immediate necessity of learning how to make phenacetin from the ground up. With the stock on hand of the imported intermediate used up, it was necessary to suspend manufacture of phenacetin entirely from June 1915 to February 1916. Finally, however, after many trying months spent on production problems and battling the toxic effects of one of the by products, a passable process was worked out and production was resumed, using all materials of American origin. This procedure was duplicated in plants all over the country on many other chemical products during the last war.

In this war, in contrast, our chemical industry has taken its place as fully equipped and as fully armed with modern technical knowledge and experience as that of any other country in the world. Our resources of chemical raw materials — salt, sulfur, air, water, petroleum, coal, natural gas, phosphate rock and limestone, to mention some of the most important — are, with only a few exceptions, abundant and readily accessible. To be sure, there are shortages of many of our major chemicals today, but in almost every case these are the result of inability of plant expansion to keep up with demand, rather than any lack of knowledge or raw materials, which are much less easily remedied deficiencies.

To the popular mind, mention of the word "chemistry" in connection with war brings a picture of poison gases, high explosives and incendiary bombs. Of course, chemicals are of prime importance in the manufacture of poison gases and munitions. But from the standpoint of the war effort as a whole, these products of chemistry

Boulder Dam. View showing spray (in foreground) when needle valves in canyon-wall outlet works are given annual test. View from below dam, upstream, showing discharge of water shot from 11 to 12 outlets.
Bureau of Reclamation

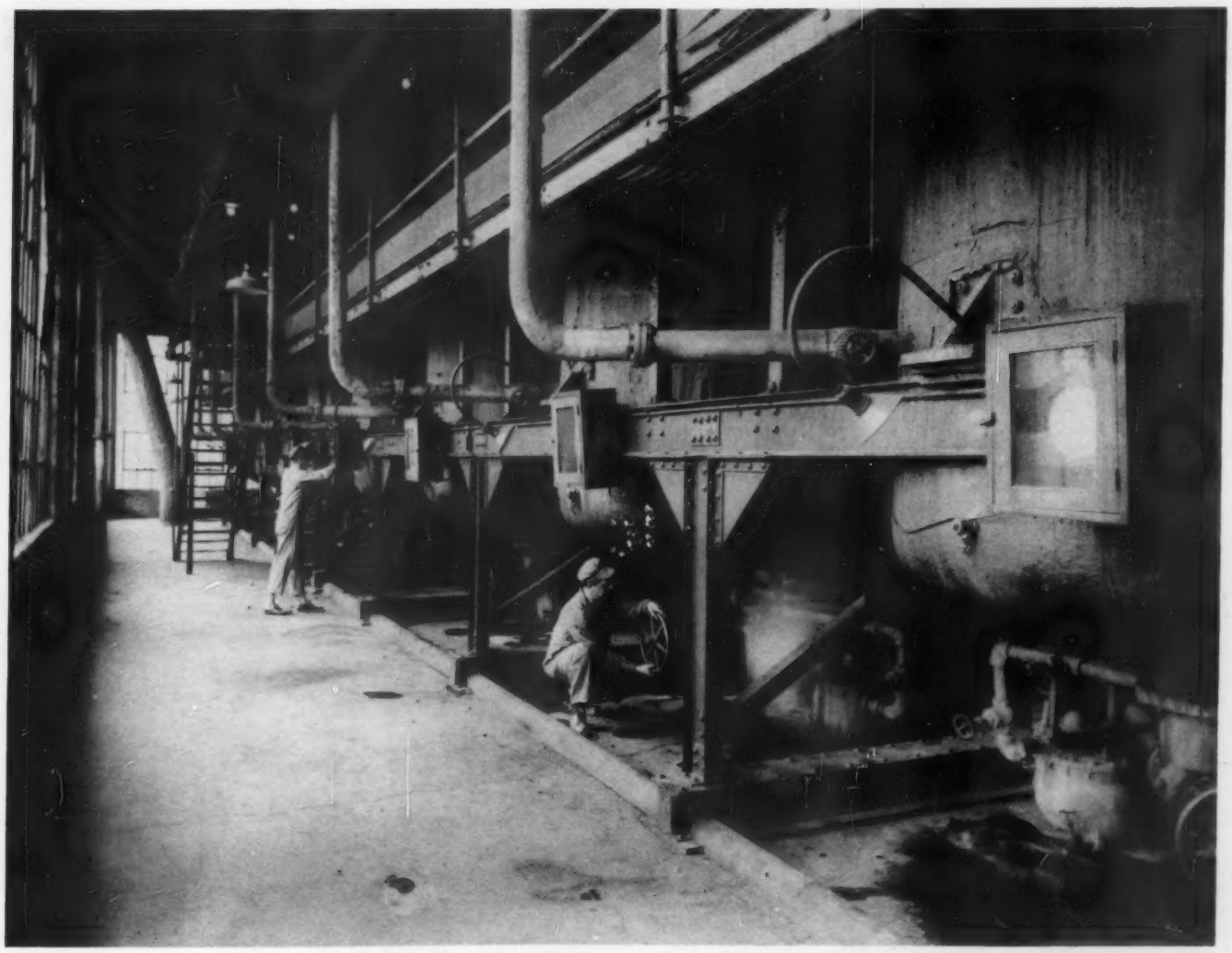
A battery of ammonia collectors *Du Pont Company*

are only a part, and a small part at that, of the total contribution of the industry. Simple materials like toluene, sulfuric acid, and ammonia are used for the manufacture of T.N.T. Also, however, they are starting materials for the preparation of life-saving drugs, permanent dyes, vulcanization accelerators for rubber, and a host of other synthetic materials of great importance in the manufacture of war goods.

Chemicals are furnishing a means for preserving our morale and comfort as we concentrate on the work before us. Our boys in camp are safer against the threat of epidemics today than they were twenty-five years ago. We now have sulfanilamide with which to fight streptococcus infections, sulfapyridine to assist in dealing with pneumonia, and a score of new and highly efficient germicides for maintaining rigid sanitation.

Scientists have delved into the secrets of vitamin chemistry. Many of the vitamins are available in commercial quantities, and they are already being used to fortify such bulk foods as flour and cereal products. Diet chemists have found what forms of the essential minerals, such as calcium, iron and phosphorus, are most easily assimilated by the body, and dietitians are working with food manufacturers on the addition of the correct amounts of these minerals to some of the common foodstuffs.

While as the work of war production goes on it will be reflected more and more in curtailment of civilian goods, the diversion of normal every-day living requirements to war purposes is not likely to be felt to the extent that it was during the last war. To a large degree this will be due to the fact that chemistry today is



taking on not only the responsibility for making many of the tools of industry, but also the job of making some of the actual raw materials that industry must use.

For example, the chemist now makes not only dyes but also the very textile fibers themselves; he makes not only rubber chemicals but also synthetic rubber; not only tanning chemicals but also material to replace leather. Beyond this the chemist is even head over heels in the metal industry. He is not creating new metallic elements, of course, but he is producing on a huge scale metals that a decade ago were unknown to the man in the street and which now are in every vocabulary.

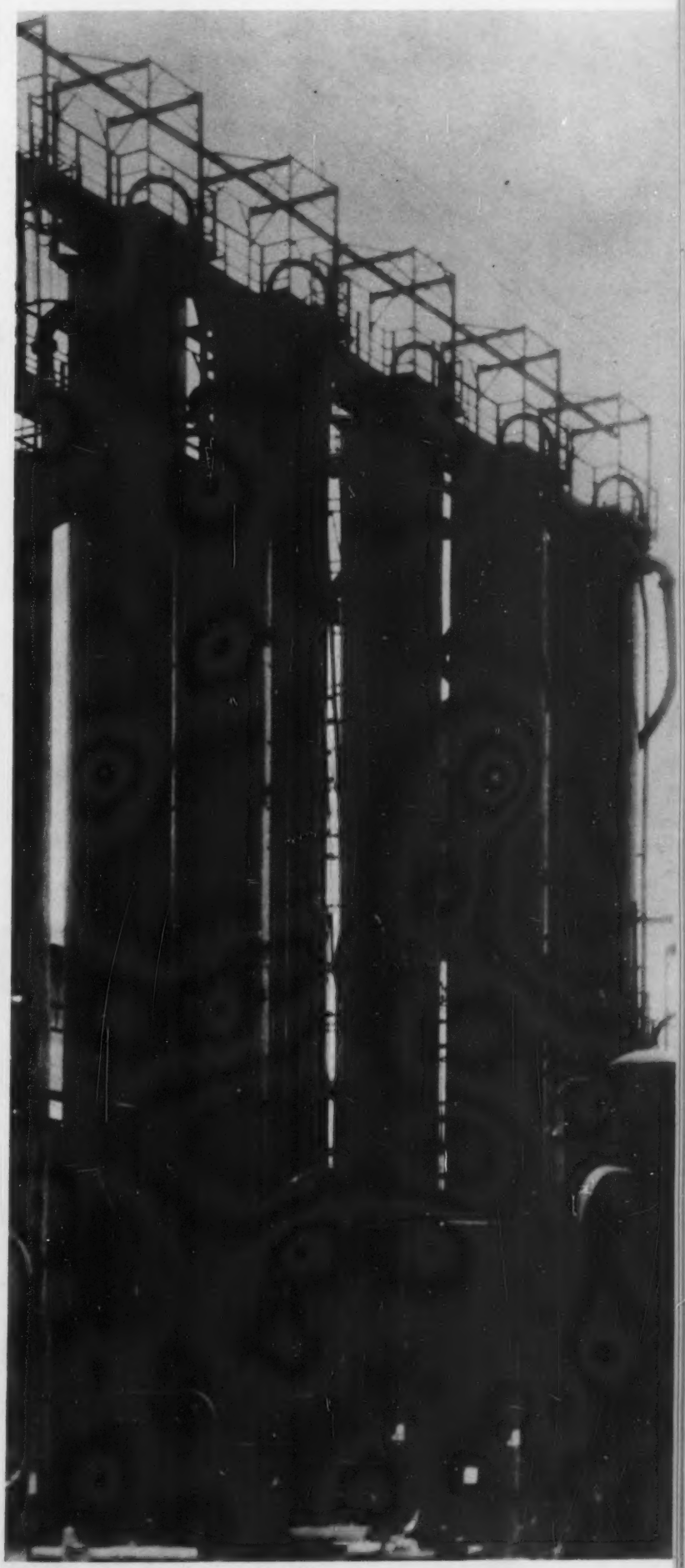
Plastics, spurred by wartime demand, are just beginning to grow from a business counting its output in pounds to one that must count its output in tons. Plastics ought not to be considered as substitutes. They are major new raw materials for industry with uses that have scarcely been tapped, and the various kinds differ in their qualities and potential uses as greatly as steel from magnesium or lead from copper.

Closely akin to chemistry's ability today to manufacture industrial raw materials is its ability to render many of the natural raw materials interchangeable. Thus, if a given raw material is cut off or its supply restricted in any way, it is frequently possible to substitute another raw material and obtain the same or a similar product. Gasoline, for example, can be made from coal, if petroleum is restricted. Textiles can be made from wood or coal as well as natural fibers. Plastics made from coal and petroleum can replace some of the metals. It is reported that the Germans are even making sugar out of wood, a raw material of which they have an ample supply.

To be sure, these changes if carried out on a large scale involve new plants and equipment which may take months or several years to build, but the significant thing is that we can do it if we have to. Witness the job American chemical engineers have been called upon to do — and are doing — in providing 750,000 tons a year of synthetic rubber by the end of 1943, which is the schedule called for by the national synthetic rubber program. In two years America will have built from scratch a synthetic rubber capacity exceeding by several times that which Germany took more than fifteen years to develop.

Through necessity, Germany has probably taken greater advantage than any other country of this particular ability of chemistry to provide replacements for many of the natural raw materials ordinarily considered indispensable. In fact prognosticators can perhaps blame chemistry for their falling short in some of their guesses as to how long Germany could hold out without certain so-called strategic materials. That Germany has been making rubber out of grain, oil and gasoline out of coal, and sugar out of wood, has doubtless been responsible in large degree for her ability to keep her large armies at peak fighting strength as long as she has. It might be said that Germany has already thrown her chemical reserves into this war, whereas American chemical industry is just beginning to make felt the full force of its "regulars" and with the exception of synthetic rubber still holds equal if not greater reserves.

Materials of construction, munitions, food, medicinals, fuels — in all of these and many more of the requirements of modern warfare do chemistry and chemical engineering play vital rôles. The intensive research, constant improvement in techniques, and steady development of new products, which have characterized chemical industry, are proving their worth in this gigantic battle of materials.



Scrubbers for the removal of carbon dioxide in water gas
Du Pont Company

WOMEN TAKE OVER

INCREASING EMPLOYMENT OF WOMEN IN INDUSTRY WILL RELIEVE THE LABOR SHORTAGE

By RALPH R. FEUERRING '44

AS the fighting in this global war grows more and more intense, and as millions of men are drafted into the armed forces, the manpower problem will become more acute day by day. A continuously increasing production for the armed forces, combined with the civilian needs, has taxed the present available labor supplies to the limit. Figures quoted only recently showed that at the present moment the country's labor and military forces total 59,000,000, of which 13,000,000 were employed directly in the war effort. At the same time, the labor demands of the industries engaged in direct war production are only beginning to be felt. To keep up with ever-growing demands, the only solution, as expressed by the War Manpower Commission, is to plan the utilization of our manpower and its effective allocation "as carefully as we are budgeting the use of our vital war materials."

Already labor shortages have developed in many fields. Mr. McNutt recently made public a list of 138 occupations essential to war production in which there is a national shortage of labor. The most serious of these are in the vital metal working and industrial machinery trades and in occupations necessary to shipbuilding, airplane and ordnance manufacture. These industries have expanded 700 per cent in the last two years and any backlog of available skilled persons has long since been absorbed.

America's women constitute the greatest additional source of the nation's labor supply. Already they are taking their place beside men in industry, and anyone standing at the gate of a factory, anywhere in the country, who sees one shift come in, and the other pouring out, will be surprised at the number of women among them.

According to the 1940 census, there are 50,360,000 women and girls fourteen years of age or over in our population; 12,850,000, or just a quarter of them, were wage earners. The rest listed themselves as housewives or school and college students. According to the Bureau of Labor Statistics estimates for the final quarter of 1941, only 480,000 of the 6,000,000 defense workers were women. Later figures are not available, but the proportion of women has undoubtedly increased greatly, and will continue to do so. At the great Willow Run bomber plant of the Ford Motor Company thousands of women are being trained today to make airplanes. Ultimately they will constitute 25 per cent of the total working force. At the Atha works of Crucible Steel Company women are replacing men as war production inspectors; at the Army's proving ground at Aberdeen, Maryland, women are today employed testing the weapons men will later rely upon in combat. These are random indications of a nation-wide trend.

When the first world war broke out the proportion of women holding jobs in civilian industry was one to four, and that ratio finally carried over into war industry. No such figures are realized today, and yet two factors make necessary a swifter and more extensive use of women in industry than in the last war. First, there is the larger demand for men in the armed forces; second, with the development of mechanized warfare, the number of workers necessary to maintain each man at the front is substantially higher than a generation ago.

The first great demand for women was not from the plants engaged directly in war production, but from the occupations from which men were continuously leaving for the armed forces or for war work. In these civilian occupations the employment of women is likely to increase faster than in war industry itself, and jobs

Ralph Feuerring has had the experience of attending elementary and high schools in Sweden, Germany, France, and Palestine. After attending courses at Columbia University for half a year, he transferred to the Massachusetts Institute of Technology, where he plans to major in Metallurgical Engineering. On the staff for the last year, this is his second article in TECH ENGINEERING NEWS. *His extracurricular activities also include the Outing Club, International Club, and skiing.*

Catherine Hertha, University of Colorado graduate and a former teacher, now being trained in engineering to release manpower for the armed services, says of her work: "It is a lot of satisfaction to know you are doing something vital to the war effort."

General Electric Company

such as bus drivers, elevator operators, newspaper reporters, filling station attendants, etc., will be taken over more and more by them.

So far, war industry has made use of women largely in jobs that can be considered "women's work." This means repetitive tasks involving the manipulation of small and light materials, and requiring only a short training period. But the old concepts of "men's work" and "women's work" are breaking down. Not only is industry experimenting with women as welders, riveters, crane operators, assembly line workers, it has recognized that with automatic hoists the old concepts of "heavy work" are losing much of their meaning. To overcome physical limitations of women, automatic hoists, conveyors, counterbalances, and other mechanical aids have been installed. Sometimes unexpected blessings have come because of such changes, because it was found that they increased efficiency.

In some war industries, women already make up a substantial percentage of the total number of workers employed. For example, the United States Department of Labor found that 30 per cent of the workers in small arms manufacture are women; in shell and bomb loading plants, the figures run from 33 to 42 per cent; in bag loading, from 35 to 48 per cent. In aircraft manufacture fewer than two per cent of the total labor force are women, though in West Coast plants the proportion of women on the assembly lines runs much higher.

Various proposals have been made for the registration of women, and the President himself declared recently that compulsory registration to determine their availability for war work was under active consideration. Chairman McNutt declared that 5,000,000 women workers will be needed by the end of 1943.

The demands of war industry require of all workers new types of training and experience. The chief sources of training are the defense training programs of the public vocational schools and certain technical schools and colleges; the work projects of the National Youth Administration; and, finally, the training on the job itself. By breaking down highly skilled operations into simple repetitive processes, by relieving skilled mechanics of many of their routine tasks, by "upgrading" workers as they acquire skill and experience, industry itself has been the foremost agency in expanding the industrial labor force. One company, for example, declared in a recent release that under the stress of war conditions and the consequent shortage of manpower, the training course for graduate engineers opened its doors to women. Declaring that while the year 1943 would produce 12,000 college graduate engineers, only 4,000 of these will be available for private industry, so that the need for replacement could be readily seen. Many such plants have had long experience in training programs; but many employers have had to start from scratch in developing such a program, frequently doing so only under the insistence of the Training Within Industry section of the War Production Board.

It is quite natural that the tremendous increase of women in industry has confronted management with many new problems, not the least of which is the wage problem. Traditionally women receive less pay than men. However, with the increasing demands and the increasing scarcity an equal pay for all workers has been almost universally adopted. The relatively high wages offered by war plants have made it increasingly difficult to recruit women as nurses, domestic helpers, hospital employees — and farmers. The necessity of increased agricultural production is the reason for the cry for a "women's land army." Rural communities are talking about a "trading work" during haying and harvest; farm security and the employment service are organizing mobile camps of workers to follow fruit and vegetable crops. But it is clear that increasing responsibility of producing the nation's food supply will rest on girls and women.

Another problem, and one directly connected to the wage problem, is the union question. The unions are well aware of the threat to wage levels, and they have expressed frequently their desire that women join the unions as rapidly as they enter industry. There is undoubtedly long standing prejudice against the use of women workers in many industries, and the fact that during the last war, women worked in railroad yards, foundries, steel plants, as road menders and tractor operators, is all too often overlooked. This same attitude has frequently barred women from vocational schools and from plant training leading to their upgrading as skilled workers and supervisors. Another factor has been the existence of protective legislation in at least ten states, including laws prohibiting night work for women, and laws fixing maximum weekly hours of work for women, all of which are being rapidly changed in view of the circumstances. (*Continued on page 22*)

Virginia L. Cassman, Purdue University, and Josephine Trumbull, NewYork State College for Teachers taking a "test" course, formerly open only to male graduates of engineering schools, learn the fine points of a "heat run."

General Electric Company

PACKAGING

USE OF AUTOMATIC MACHINERY HAS DEVELOPED INDUSTRY FOR WRAPPING THINGS

By G. A. MOHLMAN

George A. Mohlman was born in New York City September 5, 1881. He studied at Yale University from 1900 to 1904 and was active in rowing and hockey. After his initial job as runner in Wall Street, he went into the road surfacing business — then in its infancy. In 1911 he entered the brick manufacturing business. During the war his efforts were directed with the Merchants Ship Building Company in Philadelphia. Mr. Mohlman's work with the Package Machinery Company started in 1918 as a salesman in the New York office. He was promoted to vice-president in 1927 and president in 1942.

THE development of packages and package goods merchandise went hand in hand with the development of package machines. Which came first is of as little importance as the old problem about the chicken or the egg. The turning out of package goods on any commercial scale without machinery would have been an impossibility, and yet the machines could not have been developed if there had not been a market for them. Necessity is, as ever, the mother of invention.

Tobacco was undoubtedly one of the first things to be put in packages; in fact, in a literal sense, both cigarettes and cigars are packages in themselves, but the package which has been given credit for starting the trend was National Biscuit's Uneeda Biscuit. Going was awfully slow, however, for all package goods until well after the turn of the century. There had been by that time machines developed for some of the tobacco packages and for the Uneeda Biscuit package.

The first great impetus to machine packaging, however, came from the chewing gum industry. Biscuits could be, and still were, sold in bulk, and that was true of all other household commodities; but chewing gum, to be sold at all, must have each stick wrapped up to keep it from sticking to its neighbor, and the commercial development of chewing gum was not possible without the development of machine wrapping. Richard Berger was credited with making the first commercial chewing gum wrapping machine about 1903.

With the spread of the Uneeda Biscuit package, other commodities soon followed suit. Laundry soap was one of those that began to be wrapped in quantity, and machines for this purpose were quickly developed.

Soon after 1910, a number of products were being wrapped. The confectionery field took up the idea, with machines for wrapping molasses kisses and similar confections, and about that time, too, machines were perfected for wrapping chocolate bars.

After some initial mergers, the business should have grown very fast, but the advent of World War I turned men's minds to other channels temporarily. Even as it was, the development of waxed paper in roll form led to the protection of a great many packages with a wax wrap, which either had not been packaged at all before, or whose contents had deteriorated so rapidly as to destroy faith in the package idea. Such varied articles as soap powder, popcorn, confections, and cigarette cartons began to be wax-wrapped about that time, and, of course, a host of others. The cigarette industry, led by Chesterfields and Fatimas, soon after began the protection of their packages in glassine paper so that, by 1921, all but one of the leading brands of cigarettes had this added protection.

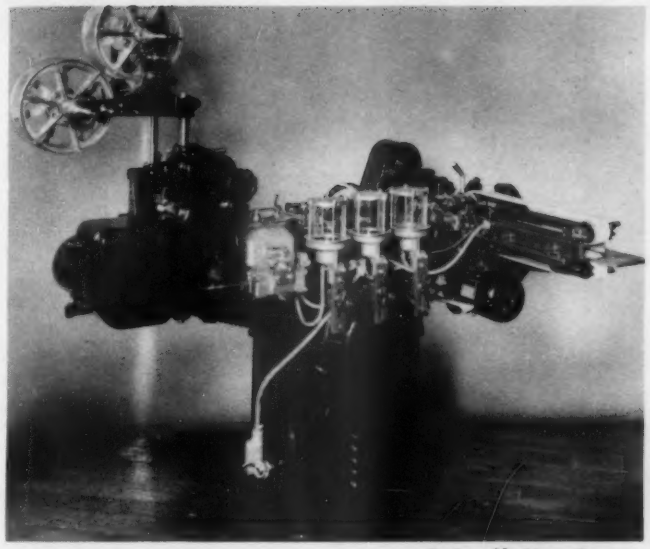
By that time, too, all chocolate bars were wrapped. The entry of this country into the war spurred this particular phase, because chocolate bars were in demand by the soldiers everywhere, and both for convenience and sanitary reasons, wrapping was obligatory. By the end of the war, too, the bulk sale of biscuits had given place everywhere to the sale of biscuit packages. Most of these were put up in a printed wrapper, but a number were protected by waxed paper, in addition.

The war, followed by the enactment of Prohibition, gave great spur to all forms of confectionery, and the twist-wrapped molasses kiss and its variations became extremely popular. Machines to form, cut, and wrap this type of candy had been developed as early as 1913, but their big sale came at the close of the war and thereafter.

Soap wrapping had spread so that not only was all toilet soap wrapped, but practically all laundry soap as well. Again, the war gave a spurt to this industry because of its demand for the by-product, glycerine.

During the decade after the war, there was a distinct lull in the development of new forms of packages, although it was a very active one for the machinery manufacturers. During that period, practically all consumer goods went from bulk to packages, adopting one of the already-developed styles, and the development of machinery was in the line of higher and higher speed and greater economy of materials. By this time, chewing gum wrapping machinery had been speeded up from its original modest twenty a minute to six hundred or more per minute. A carton of the type of Uneeda Biscuit was being wrapped at seventy per minute instead of thirty-five, with an economy of nearly twenty per cent in the amount of paper used.

Just at the end of the decade of the twenties, a new material — "Cellophane" — appeared. Its tremendous possibilities were visualized by only a few people. To wrapping machine manufacturers it spelled a new headache, but feeling that it was important to keep abreast of all new developments, a wrapping machine was chopped up, modified, and finally made to work on this high-priced luxury article. The first machine was made for wrapping a small but high-priced confectionery package, and the feeling existed in the machinery industry that it was foolish to undertake even this work, because no one putting out packages on a scale justifying machine-wrapping could afford such a high-priced commodity; but from this small beginning other articles followed suit, so that, by 1930, when moisture-proof "Cellophane" — another headache — was thoroughly perfected, it was quite easily handled. The first practical cigar wrapping machine was turned out early in



Package Machinery Company

Machine for wrapping cigarette packages

1930, and the spread of this material in the cigar industry, followed a year later by the cigarette industry, made "Cellophane" wrapping no longer a headache, but a very profitable business for all wrapping machine manufacturers. From then on, "Cellophane" was taken as a matter of course, and during the years of the depression, the groping of package goods manufacturers for new sales ideas to stimulate their business made "Cellophane" wrapping machines the chief business of all the manufacturers.

A few years later, printed "Cellophane" began to become popular, and a logical development was a paper feed actuated by a photo-electric cell, so that printed "Cellophane" would always be centered on the package.

Again, this original luxury has become a most practical adjunct to the wrapping machine family. Constant improvement in quality and lowering of price of "Cellophane" has made it have more influence on the package goods and the packaging machine industry than the advent of any other one material.

One further development in packaging machinery should not go by without notice. During the decade of the twenties, the pressure from machine users was all for greater speed and greater economy of operation; but since that time, the pressure has been toward greater versatility and adjustability, so that today, machinery is in almost all cases easily adjustable, and its price has been reduced so that, for some models, it is within the reach of the smallest producer, even though his runs are not long.

Just before World War II, great interest was taken in the development of wrapping machinery for handling a material known as "Pliofilm," which has a pure Latex base. Immediately after Pearl Harbor, restrictions were placed on Latex, and while the development of the machine was a success, the use of the new product was restricted, due to lack of material.

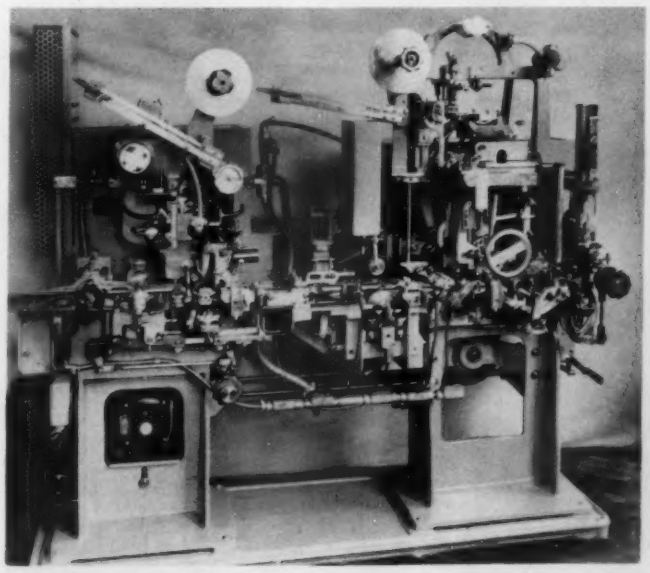
There is no doubt that, with all the activities in chemistry, and the new developments of plastic resins, wrapping machine companies will be put to the job of finding ways to use them. Some of these are applicable both to frozen and dehydrated foods, and should find their uses in many other packaging fields.

The design of packaging machinery has a definite place in industry, and uses for such equipment will be greatly increased after the war, not only as a replacement of existing, worn-out machinery, but machines of new designs which will handle novel materials now being developed.

Courtesy New England Confectionery Company

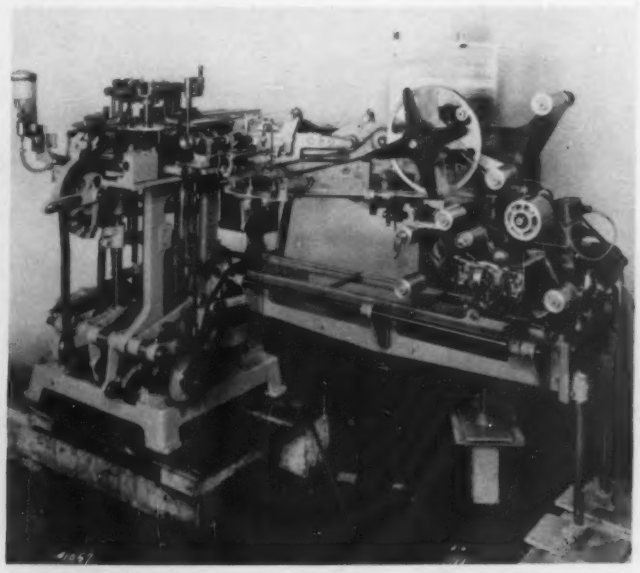
Combination machine for producing packages of gum

Package Machinery Company

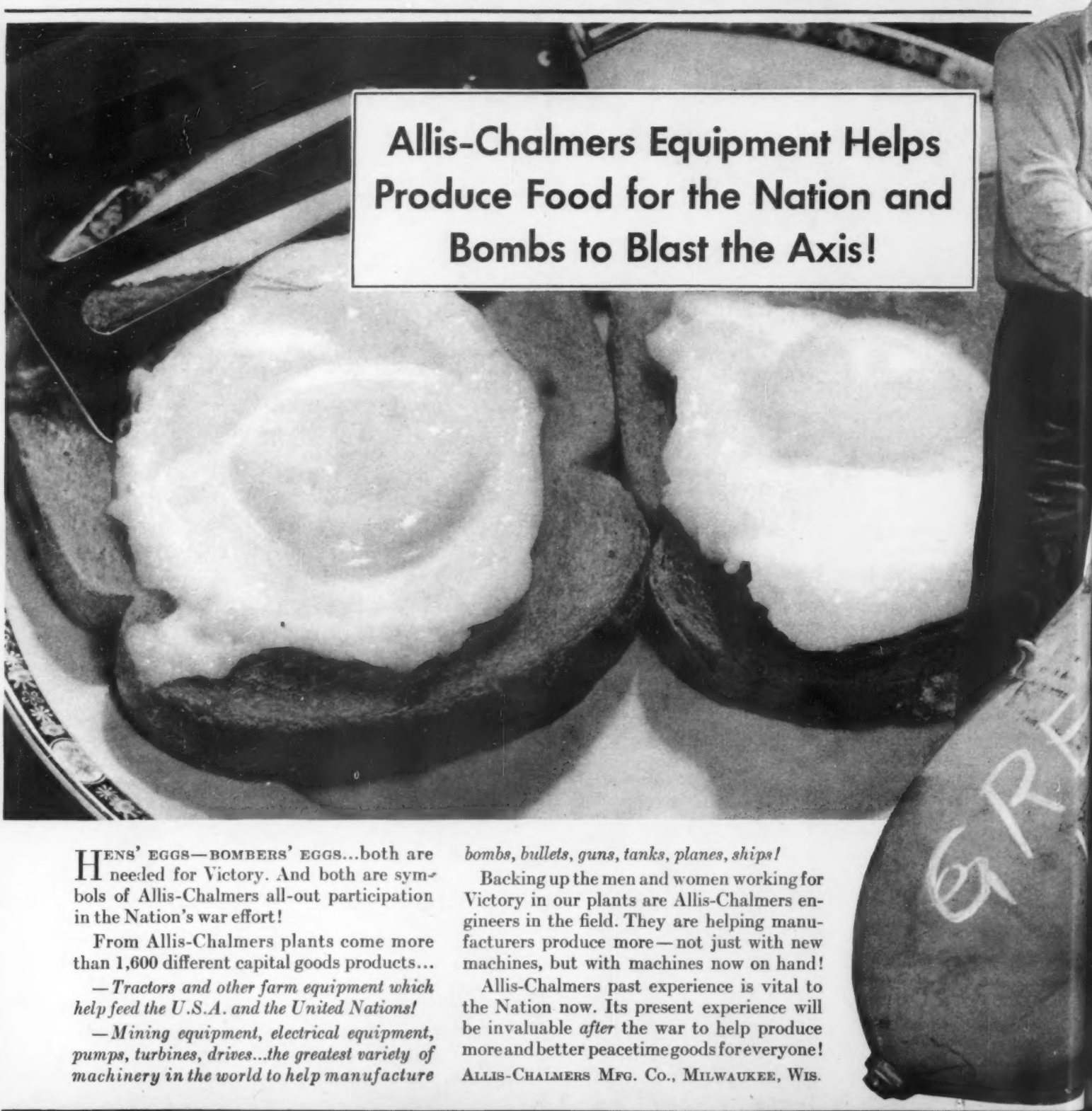


Machine for wrapping cigars

Package Machinery Company



EGGS...ON TOAST OR



HENS' EGGS—BOMBERS' EGGS...both are needed for Victory. And both are symbols of Allis-Chalmers all-out participation in the Nation's war effort!

From Allis-Chalmers plants come more than 1,600 different capital goods products...

—Tractors and other farm equipment which help feed the U.S.A. and the United Nations!

—Mining equipment, electrical equipment, pumps, turbines, drives...the greatest variety of machinery in the world to help manufacture bombs, bullets, guns, tanks, planes, ships!

Backing up the men and women working for Victory in our plants are Allis-Chalmers engineers in the field. They are helping manufacturers produce more—not just with new machines, but with machines now on hand!

Allis-Chalmers past experience is vital to the Nation now. Its present experience will be invaluable *after* the war to help produce more and better peacetime goods for everyone!

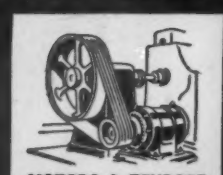
ALLIS-CHALMERS MFG. CO., MILWAUKEE, WIS.

ALLIS-CHA

OFFERS EVERY MANUFACTURER EQUIPMENT AND ENGINEERING [illegible]ERA

ELECTRICAL EQUIPMENT

STEAM AND HYDRAULIC TURBINES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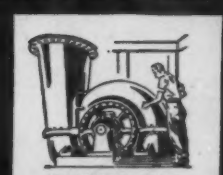
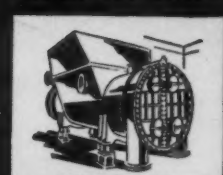

BLOWERS AND COMPRESSORS


ENGINES AND CONDENSERS

CENTRIFUGAL PUMPS

TOKYO!

A-C Equipment helps produce both steel and explosive charge for demolition bombs like the one here.

A-C Plants are casting and finishing industrial machinery at a record rate!

Allis-Chalmers tractors and grading equipment are helping build military roads and airports.

VICTORY NEWS

Rosiclare, Ill.—91 Allis-Chalmers motors constitute the major portion of a connected load of close to 1,000 hp driving the new fluorspar mill of the Mahoning Mining Company here.

The efficient layout of flexible motors and drives is largely responsible for the plant's record production of high-grade fluorspar zinc-lead ore. Throughout the mill, the Allis-Chalmers motors operate dump hoppers, flotation cells, vibrators, kilns, pumps and many other machines.

"We're Buying and Building," an A-C workman tells MGM bond rally starlets, as he machines a Navy propeller shaft.

Milwaukee, Wis.—The "feed-back" system, which utilizes 85% of the enormous power expended in breaking in aircraft engines on test stands, has been adopted by Buick in its new plant in a mid-western city.

The new engines are connected by flexible shaft couplings to water-cooled magnetic couplings, which transmit power to 1200 kva synchronous generators.

Allis-Chalmers alternating current units are at work here. They not only help to crank the new engines, but they also operate as current absorption-type dynamometers—receiving power from the aircraft engine, turning it into electrical energy and feeding it back into the line. This test set-up provides a high percentage of the power required by this company's manufacturing operations.

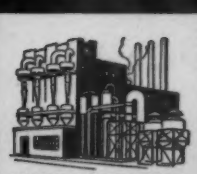
FOR VICTORY
Buy United States War Bonds

HALMERS

WE WORK FOR VICTORY — WE PLAN FOR PEACE

RING ERATION TO HELP INCREASE PRODUCTION IN THESE FIELDS...

FLOUR AND SAW MILL EQUIPMENT



CHEMICAL PROCESS EQUIPMENT

CRUSHING, CEMENT & MINING MACHINERY

BOILER FEED WATER SERVICE

POWER FARMING MACHINERY

INDUSTRIAL TRACTORS & ROAD MACHINERY

THE TECH ENGINEERING NEWS

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FRANKLY SPEAKING...

Industrial accidents are criminal. The time wasted as a result of industrial accidents slows down delivery of vital war goods to the fighting fronts, a delay which costs the lives of soldiers who are defending our homes and ideals.

For several years America has been steadily improving her record to such an extent that man-days lost due to industrial accidents in 1941 were down twenty per cent from 1938, despite the rise in production and man-hours worked. Yet the 480,000,000 man-days lost last year were enough to have built 300,000 light tanks, and assuming a capital investment loss of fifty cents per man-hour, could have financed a fleet of over thirty "hundred million dollar dreadnaughts."

Of the three great industrial time wasters, one—strikes—has almost disappeared as a factor of major importance, but industrial accidents and personal illness are almost as prevalent as ever.

The National Safety Council's bulletin on "Accident Facts" presents a breakdown on the causes of industrial accidents which shows approximately the following relationship of the most important reasons: lack of knowledge or skill, one-half; improper attitude, one-third; no personal cause, one-sixth.

It is unfortunate that due to the exigencies of time during war it is not always possible to exercise full control over the first named and most important of these causes. With some men being drafted out of plants, others still being permitted to leave vital war jobs for personal reasons, and jobs changing frequently as new models or methods are put into production, it is seldom possible to give an employee as much training as is desired or as is really necessary for him to work safely and at a hundred per cent efficiency. The problem of how to achieve proper operation without long schooling is rapidly absenting itself from the many industries which utilize continuous line or serialized production methods; here, each man on the line does only a few and usually simple operations which can be easily taught. The peril of this situation is being reduced by the instructions being given to thousands of workers through the War Production Board's "Training Within Industry" program.

Improper attitude, the second major cause, is, however, something which can be completely corrected, and which must be corrected at once. At present, one of America's leading insurance companies is sponsoring a campaign against the "Seventh Column," the Americans at home who are aiding and giving comfort to the enemy by non-coöperation in the war effort. Industrial accidents due to improper attitude are sterling examples of the Seventh Column doing its worst. A most important characteristic of this attitude, however, is that only in rare cases is it malicious, and usually it is a result only of failure to realize its importance.

While the speed required by wartime production and tooling-up makes it impossible to completely eliminate the non-personal causes of accidents (*i.e.*, improperly guarded machinery, hazardous plant arrangements, defective parts), modern engineering is making remarkable improvements which are reducing dangers on the job.

Another great industrial time waster which, while not an "accident," is largely preventable is personal illness. Records of the United States Public Health Service show that almost one million American workers fail to report each day, and the majority of these absences are due to personal illness.

(*Continued on page 22*)

COMMUNICATIONS
...directing arm of combat

This battle drawing was prepared with the aid of Army and Navy authorities.

IN modern battle, our fighting units may be many miles apart. Yet every unit, every movement, is closely knit into the whole scheme of combat—through communications.

Today much of this equipment is made by Western Electric, for 60 years manufacturer for the Bell System.

Here are some examples of communications in action.

1 Field H.Q. guides the action through field telephones, teletypewriters, switchboards, wire, cable, radio. Back of it is G. H. Q., directing the larger strategy . . . also through electrical communications. The Signal Corps supplies and maintains all of this equipment.

2 Air commander radios his squadron to bomb enemy beyond river.

3 On these transports, the command rings out over battle announcing system, "Away landing force!"

4 Swift PT boats get orders flashed by radio to torpedo enemy cruiser.

5 From observation post goes the telephone message to artillery, "Last of enemy tanks about to withdraw across bridge . . ."

6 Artillery officer telephones in reply, "Battery will lay a 5 minute concentration on bridge."

7 Tanks, followed by troops in personnel carriers, speed toward right on a wide end-run to flank the enemy. They get their orders and keep in contact—by radio.

Western Electric
ARSENAL OF COMMUNICATIONS

BRIEFING THE NEWS...

REFRIGERATED CONTAINERS FOR BLOOD DONATIONS

Originally developed for transporting small quantities of perishable foods that require temperature protection in transit, a small refrigerated container is now being used to carry blood from Red Cross collecting centers to laboratories where it is processed for shipment to America's armed forces.

Designed by Major Elihu Church, the containers service the nation's 17 blood centers where 50,000 contributions are being made each week. To handle the increasing rush of donations, the War Production Board has granted priorities for 200 more of the containers.

The Church Containers look like large trunks. Made of galvanized steel and mounted on casters so that they may be moved easily, they have an insulation thickness of four inches and a capacity of 10 cubic feet. A bunker, which may be loaded with either 100 pounds of dry ice or 90 pounds of water ice, provides low temperatures required.

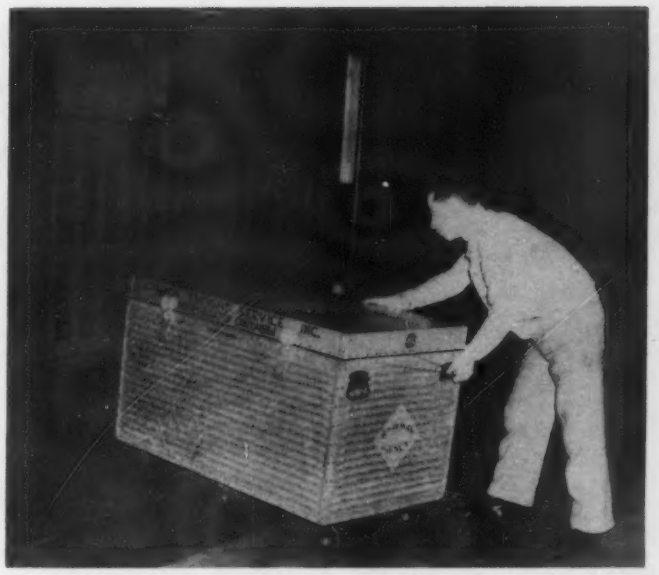
Manufacture of the containers was begun several years ago. Since then they have become universally adopted as standard equipment for the rapid transit of perishables requiring the maintenance of low temperatures in transit. The temperature may be kept either below zero, or just above freezing, by the use of dry ice or water ice. Thus the containers may carry ice cream, serums, or vaccines at low temperatures, or meat, fish, and other perishables with the use of water ice.

The major use, transportation of blood, came with the advent of the war. The Red Cross was faced with the problem of shipping large quantities of blood from its many collection centers to one of the eight laboratories where the processing is conducted. Unless the blood reaches the laboratory within 24 hours and unless it is maintained at a uniform temperature of about 40 degrees, it will deteriorate and become useless.

After the blood is taken from a person's arm it is placed in pint bottles and kept in a refrigerator, the temperature of which ranges from 35 to 40 degrees Fahrenheit. Meanwhile, at the blood center, containers are being precooled during the day until they reach a temperature of 20 degrees below zero. At a set time in the evening, depending on the train schedules, a truck arrives at the collection center.

A container has compartments for 80 bottles, each of which is first placed in an unbleached muslin bag. Then the bottles are stacked in the containers just in time for the truck to take them to the train. At the end of the trip, another truck delivers them to the laboratory. There the liquid blood is transformed, by operations of centrifugal spinning, freezing, and dehydrating, into a crystalline substance which preserves itself indefinitely, without refrigeration.

— *General Electric Company.*



A closed Church Container is pushed aboard a Railway Express car for shipment to a Red Cross laboratory. The container has compartments for eighty pint bottles of blood.

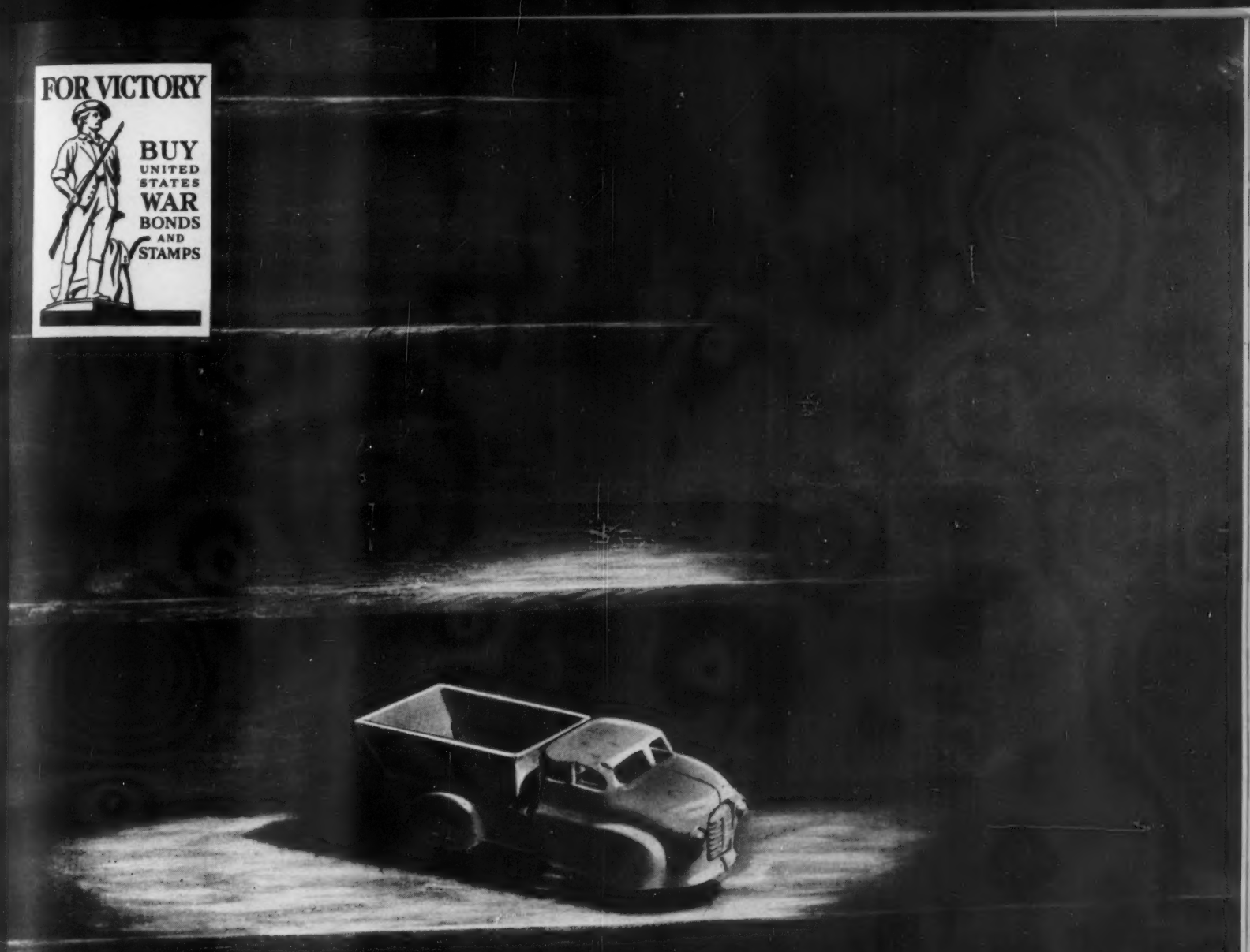
Protected by muslin bags, bottles of blood are shown being taken from a refrigerator and placed in an open Church Container in a Red Cross collection center for shipment to a laboratory.

WOOD MANHOLE COVERS CONSERVE IRON

As a result of a new development in the manufacture of manhole covers, hundreds of tons of cast iron may be saved annually. The new method, developed by officials of Los Angeles County, California, uses pressure treated wood for the covers and concrete for the frames. The saving in metal is about 500 pounds.

Extension of their use throughout the country is promised by the speed and simplicity with which the covers may be fabricated. The cover is made from laminated wood strips fashioned in either circular or hexagonal shape. The plans call for nailing the two- by four- by eight-inch laminated strips with four 20 penny nails per strip, with at least two ⅜-inch bolts through all members. In localities where it is difficult to secure nails and bolts, waterproof glue and wood dowels may be substituted.

The cover, hexagonal in shape, is 37½ inches in overall diameter and is 32½ inches between opposite faces. The faces are 18¾ inches. Two lifting slots, each 3 by ¾ inches, are set in eight inches from the opposite corners. The weight of the metal bound cover is approximately 130 pounds, while that of the glued-in dowel cover is slightly less. The lumber bill calls for 63.3 board feet of (*Continued on page 18*)



DEATH CAR...

ONLY A CHILD'S TOY on an unlighted stairway. Yet as lethal as a speeding truck for killing or crippling. For causing heartbreak and tragedy in someone's home.

Accidents . . . in the home . . . on the highways . . . in factories and offices . . . cost this nation 102,500 lives last year. This tragic toll, preventable to a great extent, was augmented by the permanent disabling of 350,000 other people . . . by 9,000,000 lesser casualties.

Production-wise, America's war effort lost heavily. In all, 480 *million* man days were lost forever. Enough to have built a total of 20 battleships, 100 destroyers, 9,000 bombers, and 40,000 tanks! Money-wise, the loss was almost 4 *billion* dollars!

Where did these accidents happen? Two-thirds of them happened outside of industry. In the home, where workers take chances they would not dream of taking on the job. They happened in darkened hallways . . . in bath tubs . . . in garages and basements. They happened in industry where someone gambled with safety.

No matter what you do, your life is precious to this nation. Don't take chances with it. Guard it for America . . . at day . . . and at night. Fight carelessness, the Master Saboteur! Join the anti-accident crusade! Help save a life!

The perfection of the famous "Eveready" fresh DATED flashlight battery called for coordination between various Units of Union Carbide and Carbon Corporation. The exact grade of graphite necessary for the "mix" was developed by the Acheson Graphite Corporation. Special alloy for protecting molds and machinery was produced by the Haynes Stellite Company, and Carbide and Carbon Chemicals Corporation provided a specially prepared paint made of "Vinylite" resins for the spun metal cap.

"EVEREADY" FLASHLIGHTS AND BATTERIES

NATIONAL CARBON COMPANY, INC.

30 EAST 42ND STREET • NEW YORK, N. Y.

Unit of Union Carbide and Carbon Corporation

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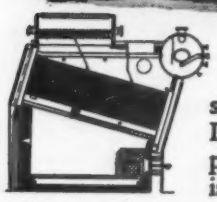
The words "Eveready" and "Vinylite" are registered trade-marks.

B&W boilers power Liberty ships



The Liberty Ship program is the biggest shipbuilding project in history and every Liberty Ship that goes into commission is powered by B&W-designed boilers. B&W is now building many of these boilers; other manufacturers, working to B&W designs, are producing the remainder.

Thus the skills and knowledge gained by B&W during peace-time leadership in boiler manufacturing are now contributed to the war-time needs of the nation. When Victory is won, B&W will be able, better than ever before, to supply those of you who enter the power industry with superior steam generating equipment.

The Maritime Victory flag and 'M' burgee now float proudly alongside the Navy 'E' at the Barberton Works. Each is an award for "outstanding achievement" and is "an honor not lightly bestowed".

THE BABCOCK & WILCOX COMPANY • 85 LIBERTY STREET • NEW YORK, N. Y.

BABCOCK & WILCOX

FOR Victory AND AFTER

★ ★ ★ ★ ★ ★ ★ ★ ★

Our research to maintain and improve the quality of Simplex insulated wires and cables, under restrictions designed to save critical materials, is getting results that mean better insulated conductors for commercial use after the war.

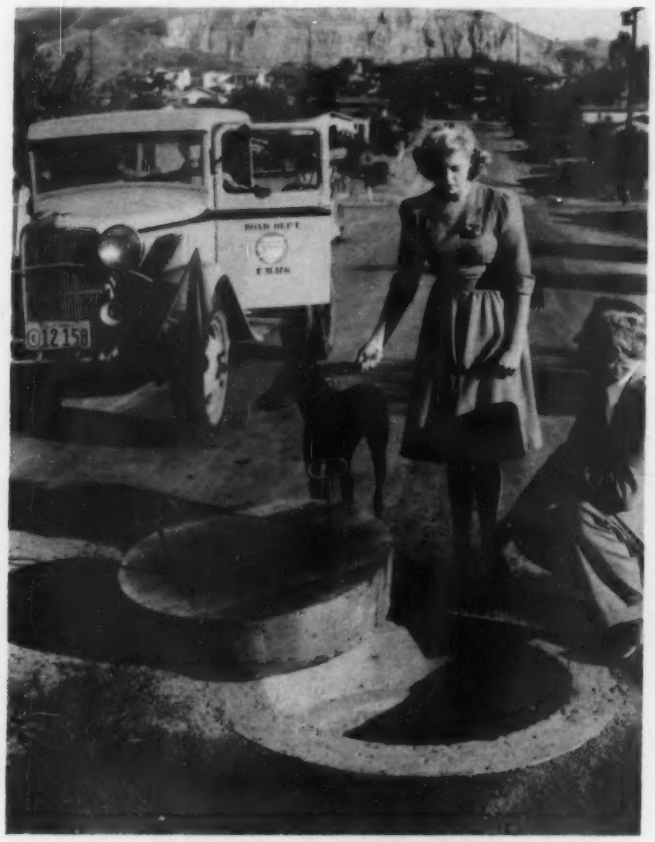
Simplex Wire & Cable Co.
79 Sidney Street, Cambridge, Mass.

BRIEFING THE NEWS...

(*Continued from page 16*)

No. 1 common creosoted Douglas fir. The frame uses 0.14 cubic yards of class "A" concrete.

The concrete retainer has two ¼-inch reinforcing rods buried in it — one in the upper and one in the lower section — inside the perimeter. About 24 feet of rod is required to permit overlapping of the ends. To give ample space for expansion and contraction between the cover and the retainer, the six sides of the cover are faced with ¼-inch plywood before the concrete is poured. Circular covers may also be used as inside forms by tacking roofing paper to them for the required ¼-inch clearance.



Wood manhole covers — recently designed by Los Angeles County, California — get lots of attention from residents of the county. The cover is constructed with Wolmanized lumber. County specifications call for pressure-treatment with either Wolman Salts or creosote. Each cover with its concrete frame saves approximately 500 pounds of cast iron — the amount normally required for a metal unit.

Because decay and termite attack at the edges of the unit would seriously reduce the safety and useful life of the cover, preservative treatment of the wood by a pressure-impregnation process in accordance with the American Wood-Preservers' Association standards is specified. Because of the fire risk, a clean treatment is preferred to an oil-borne treatment such as creosote.

Wear and splintering of the wood is reduced by laying the laminated strips at an angle of 45 degrees to the line of traffic. Also, the application of a thin coating of bitumuls or emulsified asphalt — covered with dry sand or pea gravel — to the top of the cover helps to reduce the wear. If possible the surface of the cover is kept flush with the roadway, which minimizes the strain on the cover.

— *American Lumber and Treating Company.*

(*Continued on page 20*)

What kind of Future should a man prepare for?

One thing is certain: The future is going to be very different.

Now, as you finish your training, many of you with your war participation fully determined, the future of peacetime seems very remote.

It *is* a bridge we're all going to have to cross when we come to it. Nobody knows exactly what it will look like. But we do know that what lies on the other side will be largely what all of us together make it.

Even now, responsible men in industry are thinking how to make jobs for the men coming back from the services, and for the men now in war applications. It will be done by dreaming up new things to make, and new ways to make old things better.

This is being done by a combination of imagination and engineering, industry by industry. Here at Alcoa Aluminum we call it Imagineering. It is the thing that made our company the leader in its industry—that got aluminum ready to do the great job it is doing in this war. All our people practice Imagineering, as second nature, whether they are called engineers, or salesmen, or production men, or research men.

The future isn't going to be made out of laws, or pacts, or political shibboleths. The only kind of future worth having will come out of freedom to produce, and out of the *Imagineering* of men who make the things that civilization rests on.

If we could go back to college again, we would get ready to be an Imagineer, in whatever particular field our interests lay. The opportunity for young men with imagination is going to be unparalleled.

A PARENTHETICAL ASIDE: FROM THE AUTOBIOGRAPHY OF

ALCOA ALUMINUM

• This message is printed by Aluminum Company of America to help people to understand *what we do* and *what sort of men* make aluminum grow in usefulness.

BRIEFING THE NEWS...

(*Continued from page 18*)

JEWELS FOR ELECTRICAL INSTRUMENT BEARINGS

Mass production of glass substitutes for war-scarce sapphire jewels has spurred the manufacture of millions of delicate indicating instruments used in radio mobile power station and lighting equipment, according to one of New England's manufacturing plants.

Demand for unprecedented quantities of miniature indicating instruments for measuring the flow of electricity is responsible for the development of substitute glass jewels. The moving parts of such instruments are of watch size and delicacy, each requiring two cup-shaped jewels comparable in size to the head of a pin. Such jewels are known as "Vee" jewels, for in the flat top of each one is a V-shaped depression in which a cone-shaped steel pivot rotates. The radius of each depression measures from three to four thousandths of an inch.

Up until the war, Swiss craftsmen supplied most of the "Vee" jewels used. The essential ingredient in sapphires, both natural and synthetic, is alumina. The hardness of sapphires, second only to that of diamonds, is essential to withstand the steel bearing which the jewel supports.

Due to the war, the Swiss supply of "Vee" jewels was hopelessly inadequate. As a result, the aforementioned New England plant developed a secret mass production process which can yield millions of satisfactory glass substitutes for the "Vee" jewel annually. By means of a recent improvement now being installed, the process will become completely automatic. (*Continued, page 23*)

V-jewels for electric-instrument bearings being inspected. Close-up view

V-jewels for electric-instrument bearings being processed and inspected

Son...

HE has just turned eighteen. Shaves twice a week and maybe a hair or two is sprouting on his chest. He shies away now when his dad tries to be affectionate and we noticed some lipstick on one of his handkerchiefs after a country club junior dance not so long ago. But it seems only yesterday, perhaps it was the day before, that he was a chubby legged kid swinging from the arch of the doorway, leading to the dining room, in a gadget that was something like a breeches buoy and he was sucking at the end of a turkey bone.

He went back to school this Fall, a tall, athletic lad, budding into manhood, but there was something else on his mind beside the football and hockey teams or the little blonde girl with whom he had "palled" around during the Summer. It seems as though he was listening for a certain call—the Clarion call that poets sing about—and, perhaps we just imagined it, but we thought we saw an upward jutting of his chin, a certain light in his eyes, and a sort of a rearing-to-go expression in his face.

It chilled us a bit in the region of our heart, when we thought of his discarding the sports coat for the "O.D." of the Army or the blue of the Navy. There was a bit of a catch in our throat as we thought of his putting aside his football helmet for one of steel; of his hanging up his hockey stick and reaching for a gun. After all we still regard him as just a little boy.

They tell us that the eighteen and nineteen year old lads are to be called to the service. When that day comes to us there will be prayers, but no tears. We shall not mourn nor shall we be fearful. Rather there will come welling up from our hearts that warm feeling of pride that millions of other parents will sense when their beloved lads marched away. Our lad is no different than the others. We are no different than other loving parents, nor is our sacrifice any greater. They are going to make great soldiers, sailors, marines and fliers out of these youngsters. And they will become a mighty force when they take their places beside their brothers in arms. They too know what they fight for. They too know full well of the sacrifices that must be made before the evil powers that threaten the world can be overcome.

And let us not forget that they are counting on us. They know that we shall not fail them.

God be with them and their brothers.

WOMEN TAKE OVER

(*Continued from page 9*)

With all the headaches and changes that women have brought into industry, management has found that they can do the job, and most plants now report favorably on their woman workers. American ratios still fall far short of British, however. Since Dunkirk, the number of women at work in British war industry and the variety of their responsibilities have increased steadily. The principle, as expressed by the Minister of Labor, is that "nothing that women can do, or can learn to do, should be allowed to absorb a man of military age," and the compulsory registration of women has long been in effect. British women now do riveting, drilling, stamping, pressing, gauging, light operations and heavy operations, many types of transport and repair work. In some munition plants they make up 80 per cent of the total labor force; and in all cases their employment has been entirely satisfactory.

In the United States, the United States Employment Service has recently catalogued 1,800 war and 900 non-war occupations suitable for women. At the same time, the War Labor Board, the National Association of Manufacturers, and the unions have all gone on record favoring the equalizing of wages for men and women. Under these circumstances, women in industry might soon play a dominating rôle. The question, however, as yet unanswered, and put to rest for the duration, is the reallocation of these jobs after the war. Will they make room for the men returning from the battle front?

In the meantime, they will do the job.

VITAL

TO OUR VAST WAR EFFORT

● Efficient small tools, such as *"Greenfield"* has been manufacturing for more than 70 years, are essential to America's armament program. "G.T.D. Greenfield" Taps, Dies, Twist Drills, Reamers and Gages are helping to build planes and tanks, ships and guns on a thousand "production fronts."

America's great metal working industry has learned by long, practical experience that the "G.T.D. Greenfield" trade mark means utmost reliability and accuracy in these vital tools.

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GREENFIELD, MASS., U. S. A.

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TAPS · DIES · GAGES · TWIST DRILLS · REAMERS · SCREW PLATES

FRANKLY SPEAKING . . .

(*Continued from page 14*)

Solution of this, and the problems of improper attitude and lack of training, must be undertaken jointly by labor and management. It is easily understood that management must assume the initiative. "Employee education" is frequently suggested as the universal panacea for production line ills; this it may well be, but it is a very difficult thing to realize, especially when the time is short. However, a well planned propaganda campaign can get the same results for the period of its currency.

No definite rules for the conduct of such a campaign can be established, but a few cardinal principles can be set forth: if posters are used, make them colorful, the caption short, and change them frequently; company messages inserted in pay envelopes should be brief and to the point, yet should not seem belligerent, and should be changed weekly; if safety signs are posted on or near certain machines they should be clear but not childish; signs in the washrooms urging cleanliness should be merely reminders, and in no way suggest that employees ever neglected this duty; above all, management propaganda should never assume a "holier than thou" attitude.

This "dynamic propaganda" method is not infallible, but it has worked well many times in the not too distant past, and it should continue to work in the future. And each time it saves a single man-hour on the production line, it is making the war shorter and saving the lives of our brothers in arms.

BRIEFING THE NEWS . . .

(*Continued from page 20*)

Natural deposits of sapphire pebbles are found in Australia, Ceylon, and Montana. Synthetic sapphires were manufactured to a great extent in France, Germany, and Switzerland of aluminum, hydrogen, and oxide. Makers of minute instruments in America experimented with cutting their own sapphire jewels, but the making of "Vee" jewels was a highly specialized art, and since the great majority of machine equipment and trained personnel was concentrated in Europe, almost all of the miniature jewels were imported into this country by 1920.

The production of sapphire jewels under the best of conditions, however, is difficult. The tendency in cutting, smoothing, and polishing is to produce a surface which is not truly spherical. As a result, in 1929, experiments were started with a jewel made from a drop of fused glass, but control of the shape proved to be difficult. After a few years of producing fused glass jewels, European producers came forth with a sapphire jewel which had much better contours, with the result that the use of glass jewels disappeared.

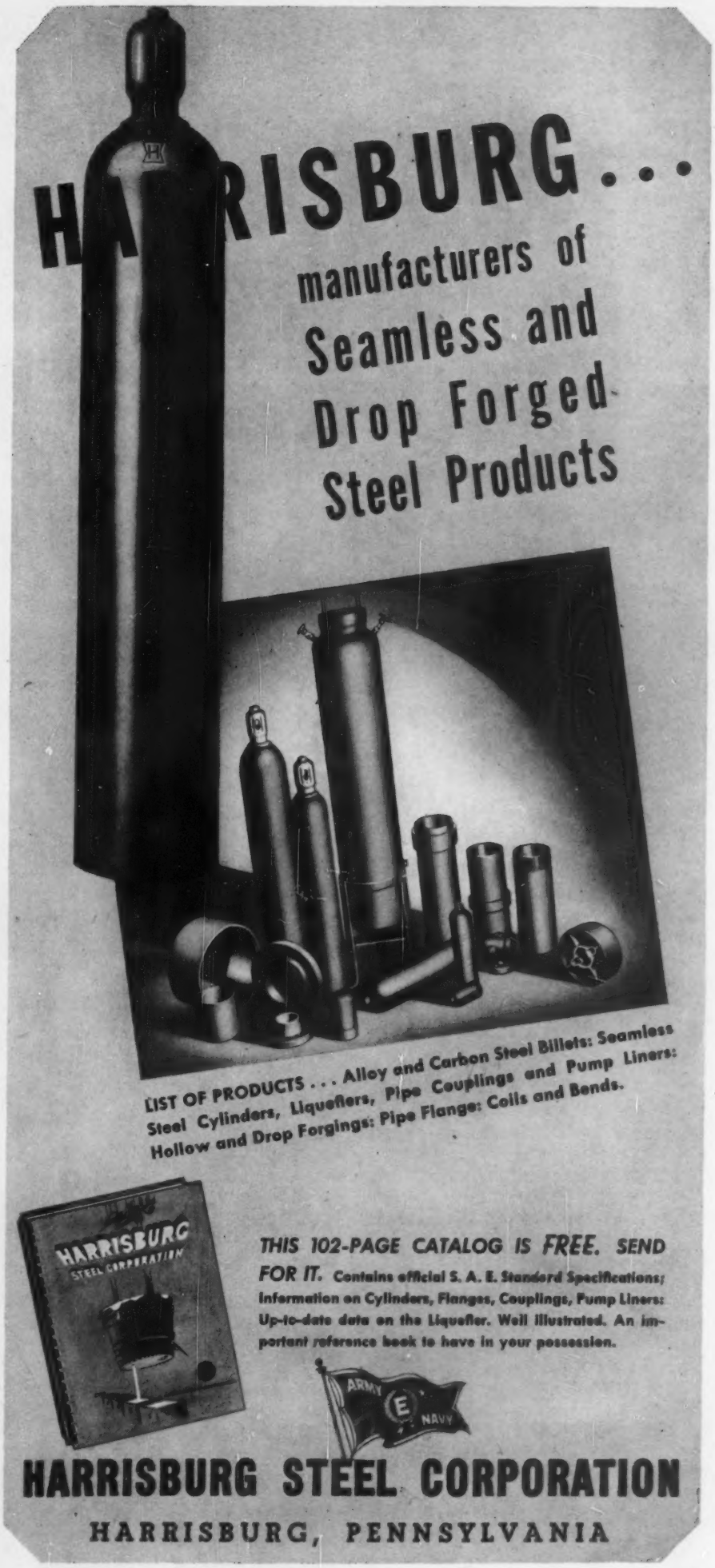
At the outbreak of the war in 1939, American users of miniature jewels bought large reserve supplies. However, with the tremendous demand for miniature indicating instruments by the Army, the Navy, and Industry, the supply of jewels soon gave out. The previous experiments with glass jewels were revived, and new tests with improved glass formulas were begun. When a satisfactory compound was selected, laboratory engineers started to design new equipment for mass production of this new glass jewel. As a result, the demands for glass jewels are now able to be fulfilled without importing them.

—*General Electric Company.*

NEW PLASTIC REPLACING STEEL

The latest development in structural plastics used to replace steel and other metals is a compound of cellulosic fibers and a resin powder known as Vinsol. It is part of an ever-growing group of plastics made from resin-treated, laminated paper products. It is a thermoplastic, of fibrous-resin composition. Light in weight, it combines hardness, stiffness, high density, and toughness with low water absorption.

As a possible replacement for steel and other scarce metals, the



LIST OF PRODUCTS . . . Alloy and Carbon Steel Billets: Seamless Steel Cylinders, Liquefiers, Pipe Couplings and Pump Liners: Hollow and Drop Forgings: Pipe Flange: Coils and Bends.

THIS 102-PAGE CATALOG IS FREE. SEND FOR IT. Contains official S. A. E. Standard Specifications; Information on Cylinders, Flanges, Couplings, Pump Liners: Up-to-date data on the Liquefier. Well illustrated. An important reference book to have in your possession.

ARMY E NAVY

HARRISBURG STEEL CORPORATION

HARRISBURG, PENNSYLVANIA

Vinsol resin promises to be of great value in the war effort. It is said to be suitable for food containers, automobile license plates, and certain kinds of conduits. In connection with use in conduits, it is interesting to note that the resin has particularly high resistance to petroleum products. In cement-filled Lally columns, it can support light loads. Many additional uses have been suggested for it in trucks, street cars, and busses.

There is an ample supply of all materials used in the production of this plastic. Only newsprint, clean cotton rags, sulphite, sulphate, and the like are required. Existing conventional paper-making machinery, without any special installations, is all that is used in the manufacture. Thin sheets for laminating may be made continuously on the cylinders of Fourdrinier paper machines. Thicker sheets for laminating or for homogeneous pressing can be made on wet or insulation board machines. The raw stock must be cured by means of hydraulic steam presses operating at 275–350 degrees Fahrenheit, at 800–1,500 pounds per square inch, and having facilities for rapid cooling. The curing cycle lasts from four to six minutes. Since second-grade and rejected material is of unusually low percentage in this process, multiple platen production is considered to be thoroughly feasible. Although special presses, special compression molds, and dies are needed when specific molded shapes are desired, this process can sometimes be shortened. Simple shapes, like corrugated sheets and fluorescent lighting reflectors, can be made from multiple dies. The production methods for Vinsol resin as a whole are so well adapted to present conditions that quantities are now available without priority rating.

— *Hercules Powder Company.*

PALLADIUM FOR JEWELRY

Charles Engelhard, the leading authority on platinum metals in the United States, in connection with the War Production Board's order restricting the use of platinum in jewelry, states that the trade is fortunate that it has access to ample supplies of both gold and palladium, without any restrictions.

To meet the many inquiries from the jewelry trade concerning the availability, the working properties and the usefulness of palladium, Baker & Company, the world's largest dealer in platinum metals, has placed its staff of metallurgists and technicians at the jewelry manufacturers' disposal.

There is a sufficient quantity of palladium available to provide a satisfactory alternate for platinum. The major sources of supply are Canada, Alaska and South America. From the standpoint of recovery from ores and deposits, palladium is more rare than gold or platinum. However, by modern metallurgical processes it is possible to recover it in worth-while commercial quantities.

Palladium has been used in alloys with platinum. These alloys are hard and strong enough for rings and the setting of gems with security. They can be worked into designs for pins, brooches and larger pieces. Jewelry manufacturers who have used palladium have found it workable in all operations. The finished product has a lustre and brilliance without tarnish.

Mr. Engelhard feels that the jewelry buying public will recognize palladium as a metal similar to platinum. Its color is suited for the setting of diamonds, and harmonizes with all other gems.

— *International Nickel Company.*

NEW ELECTRONIC "EYE" TO MEASURE UNITED STATES SUNFALL

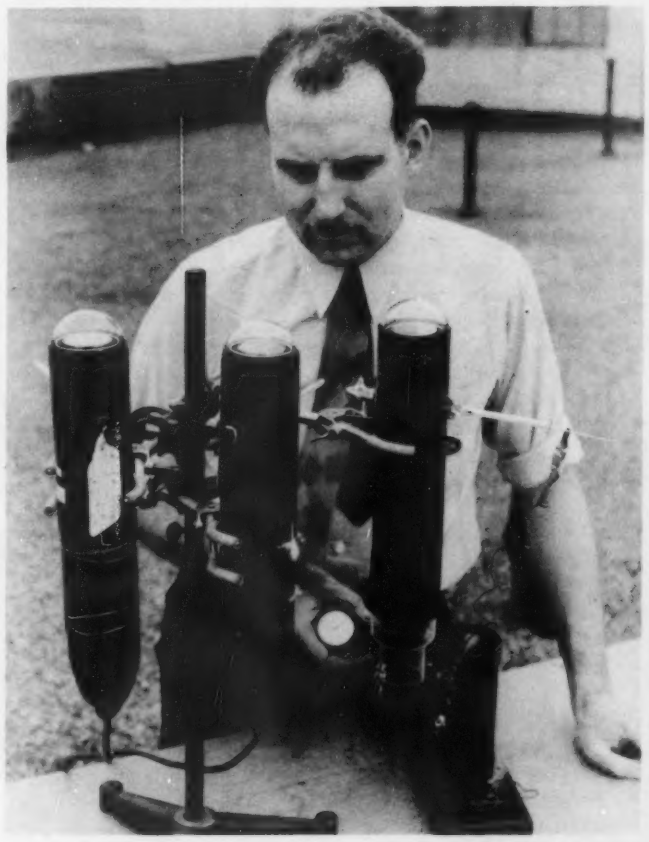
The daily measurement of "sunfall" in the United States will be made possible by new sensitive electronic "eyes," which see and record the invisible ultraviolet rays in sunlight.

With this new tool, electronic research has made it possible to accurately meter and standardize a unit of sunlight. This ultraviolet sunmeter resembles a long, oversized radio tube. On the top is a flat metal button the size of a half-dollar, surrounded by a circular electrode. The refined metal is only sensitive to that portion of sunlight which causes sunburn. When these rays strike the disc, a stream of photoelectrons is released, which travel to the electrode. Because of the small size of the current, it is expressed in millionths of watts or microwatts. From the electrode the photoelectrons pass to a tiny condenser, which stores up the energy. It releases the energy in a single charge across an electrical circuit in the tube. The condenser's discharging actuates a sensitive relay trigger, which registers a click. This reveals that a known quantity of ultraviolet is reaching the earth.

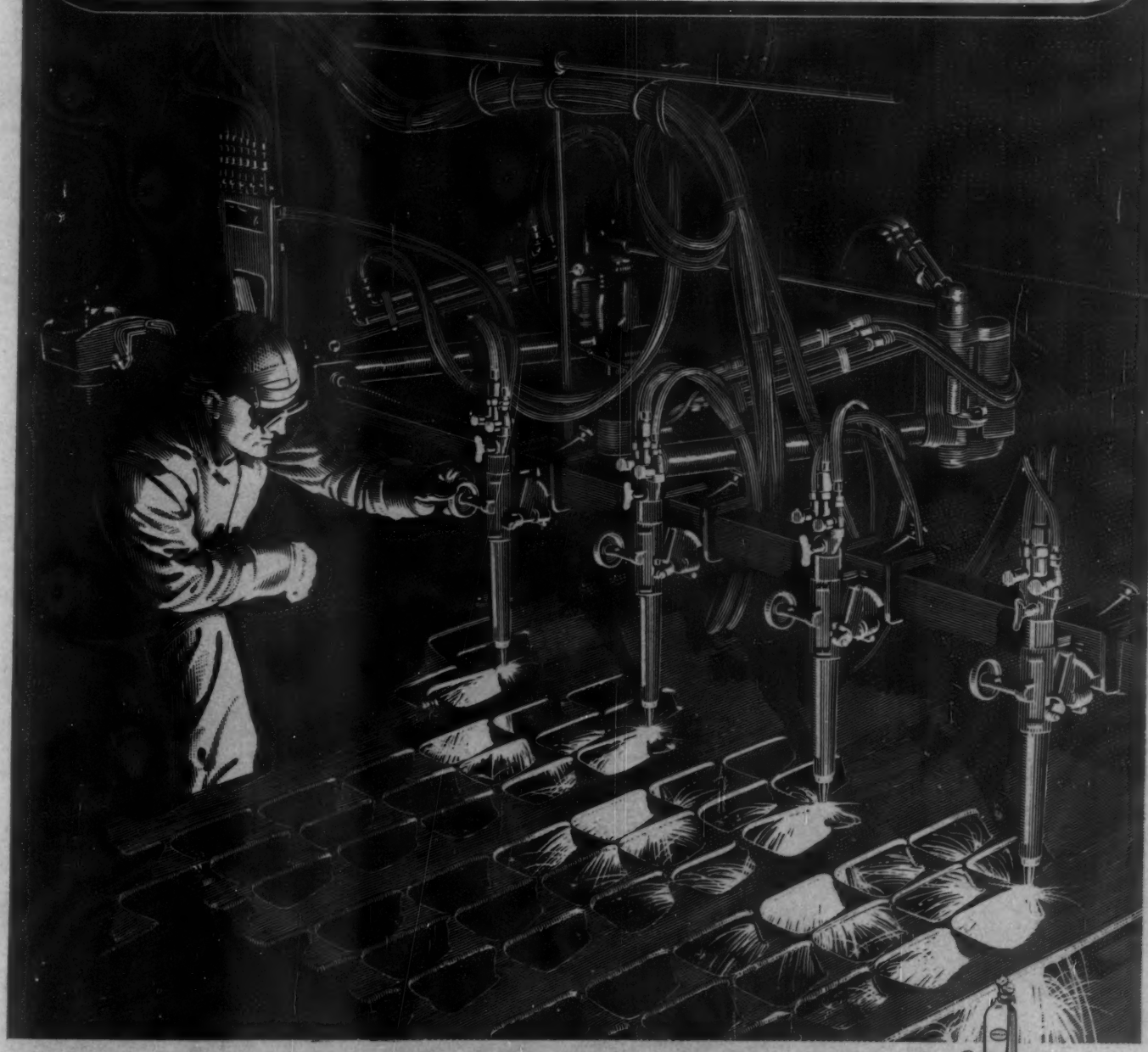
The information obtained by ultraviolet sunfall measurement will be made available to farmers, colleges, meteorologists and physicians, for the study of the effects of ultraviolet radiations in the upper stratosphere on weather conditions on the earth, and the effects of the invisible ultraviolet rays on human health.

— *Westinghouse Electric and Manufacturing Company.*

Sensitive new sun measuring instrument records quantities of ultraviolet sun tan rays. This new instrument will make daily measurements of U. S. "sunfall" possible for the first time in history as part of a nation-wide health study. Electronic cells in the meters operate even on cloudy days by detecting the invisible ultraviolet which penetrates through clouds and haze. The instruments reveal that cloudy days are often as good for sun tan as days of sparkling sunlight.



FLAMES ARE THE CUTTING TOOLS



EACH hour is worth ten in production time when steel plate for our machines, guns, tanks and ships are multiple flame cut by the Airco Oxy-acetylene Flame. Slicing its way through steel and iron, this white hot flame has revolutionized metal fabrication by providing a swift, accurate, economical method of shaping sheets, forgings, castings, structures and pipe. Size and shape which can be cut is practically limitless. A single piece or hundreds of identical pieces can be shaped to amazingly close tolerances. Changes in design require only new blueprints or templets to guide the torch.

Other defense jobs being done by this versatile metal working tool include hardening steel to any degree and depth; welding two or more metal parts into a strong, homogeneous unit; machining metals with unrivaled speed, and cleaning and dehydrating metal surfaces for long lasting paint jobs. To insure greatest speed, efficiency and economy in applying the Airco Oxy-acetylene Flame to defense production, Air Reduction offers industry the cooperation of a complete engineering staff.

To better acquaint you with the many things that this modern production tool does better we have published "Airco in the News", a pictorial review in book form. Write for a copy.

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G-E Campus News

THE HOME GUARD

A DEVICE which can be installed in the home to give both audible and visible warning of air raids has been developed by J. L. Woodworth (U. of Idaho, '24) in the G-E Carrier Current Laboratory.

Designed to operate on carrier current systems, the new gadget makes it possible to contact air raid wardens and civilian defense workers without increasing the load on telephone lines.

When the air raid signal is sent from the transmitter at the power station, the home warning device (which resembles an ordinary house meter) begins to buzz.

After it has thus called attention to itself, the device lights up, and on its dial will appear a colored signal—yellow for preliminary caution, blue for advance caution, red for air raid, or white for all clear—that corresponds to the signal sent from headquarters.

"VEE" JEWELS

THE General Electric Company has developed a method of fusing a special type of glass and forming a miniature jewel. How it's done is a military secret, but the jewels are made on a mass-production basis.

The jewels, called "Vee" jewels (not V for Victory, but "Vee" for the V-shaped depression in which a cone-shaped steel pivot rotates), are in great demand for use in the indicating instruments that measure the flow of electricity in wartime fighting and industrial control equipment. The moving parts of these instruments are of watch size and delicacy, each requiring two Vee-shaped jewels about the size of the head of a pin.

The G-E "gem" has been developed as a substitute for the "Vee" jewels made from sapphires formerly supplied by Swiss craftsmen.

YOUR SMOKE IS SHOWING

A TRAIL of smoke often leads enemy submarines to their intended victims, but an electronic tube might help to give the subs the slip by instantly warning the ship's fireman when smoke is coming from the vessel's stack.

General Electric has already put the phototube, most versatile of the electronic tubes, to work in industrial plants to warn of smoking stacks and to save fuel. W. C. White (Columbia, '12), director of the G-E electronics laboratory, thinks a similar arrangement might be used in ship stacks.

A beam of light, thrown across the smoke column in the chimney, shines on the tube. When the smoke gets too thick, the light is blocked and the phototube works a relay which sounds a warning for the fireman.

GENERAL ELECTRIC

The Murray Printing Company
Kendall Square, Cambridge

TECH ENGINEERING NEWS